ISSN: 3049-2521 (O)

Volume 3 Issue II

2023

LEX AD COELUM

A Flagship Journal of

CENTRE FOR AVIATION AND SPACE LAWS

THE WEST BENGAL NATIONAL UNIVERSITY OF JURIDICAL SCIENCES, KOLKATA

Patron

Prof. (Dr.) Nirmal Kanti Chakrabarti

Vice-Chancellor, The West Bengal National University of Juridical Sciences, Kolkata

Editor-in-Chief

Prof. (Dr.) Sandeepa Bhat B.

Professor of Law, The West Bengal National University of Juridical Sciences, Kolkata

Editorial Board

Prof. (Dr.) Pablo Mendes de Leon

Professor Emeritus, Air and Space Law, Leiden University, Netherlands

Prof. (Dr.) Steven Truxal

Professor, Air and Space Law, Leiden University, Netherlands

Prof. (Dr.) Christopher Newman

Professor of Law, Northumbria University, England

Prof. (Dr.) Wian Erlank

Professor of Law, North-West University, South Africa

Prof. (Dr.) Fabio Tronchetti

Associate Professor of Law, Northumbria University, England

Prof. (Dr.) V. Balakista Reddy

Chairman, Telangana Council of Higher Education;

Former Professor & Dean Mahindra University; Former Registrar, NALSAR

Editorial Assistant

Nirbindu Banerjee

Published by: The West Bengal National University of Juridical Sciences, Kolkata

LEX AD COELUM

TABLE OF CONTENTS

VOLUME 3 ISSUE II (JULY – DECEMBER 2023)

P. No.

1. **Beyond Borders: Applicability and Contours of Criminal Law in Space**.....26-30

   Tanmay Mehta

2. **Sovereignty in Space: Changing Dimensions**.....31-35

   Kaushik H.M.

3. **Cislunar Space Strategy in Light of the Outer Space Treaty**.....36-40

   Thomas Paul Kanatt

4. **Chandrayaan – 3: An Opportunity to Set Right the Mistake of Artemis Accords**.....41-45

   Prof. (Dr.) Sandeepa Bhat B.

5. **From Hesitation to Engagement: India's Path towards Global Aviation Sustainability**.....46-51

   Kiran Mohan Vazhapully

6. **ICAO's Approach to Address Aviation Pollution: A Critical Analysis**.....52-57

   Dr. Aruna Kammila

BEYOND BORDERS: APPLICABILITY AND CONTOURS OF CRIMINAL LAW IN SPACE

Tanmay Mehta[*]

Keywords: Criminal law -Extraterritoriality – IGA – International Space Station – Outer Space Treaty

Even though space law is itself an evolving field, one field that may present (when applied in space) myriad complex challenges due to the unique nature of its applicability is criminal law. Till now, the jurisprudence of space law has not been confronted with a matter which has tested the applicability and contours of criminal law in space. It is also interesting to note that no one has yet been formally charged, let alone convicted, for the commission of a crime in space. However, as space becomes increasingly accessible and more open to the private sector, we are bound to see instances of unlawful activities in space too. For example, in 2019, a NASA astronaut allegedly hacked the bank account of her estranged spouse while she was aboard the International Space Station. The claims against the astronaut, however, were later found to be false. States at the individual level have also been making an effort to cover this uncovered field. An example of this is Canada's Budget Bill of 2022 which contained provisions to crack down on space crimes. The Bill, *inter alia*, extended the applicability of criminal law to outer space by providing that "a Canadian crew member who, during a space flight, commits an act or omission outside Canada that, if committed in Canada, would constitute an indictable offence is deemed to have committed that act or omission in Canada, if that act or omission is committed(a) on, or in relation to, a flight element of the Lunar Gateway;(b) on any means of transportation to or from the Lunar Gateway; or(c) on the surface of the Moon." With this brief background and general overview, this write-up explores the hitherto not much-explored area concerning the applicability of criminal law in space in the following sections.

Application of Criminal Law and Jurisdictional Ambiguity in Space

One of the major issues relating to the applicability and functioning of criminal law in space is the nature of the law itself. Criminal law, by its very nature in the traditional setting, is territorial and is applicable only within the national frontiers of

© [Author(s)] — Published in *Lex ad Coelum* with permission.

a State. Thus, determining the applicable law and jurisdiction in cases concerning a field which has no boundaries and is not subject to the territorial rights of States may prove to be problematic and require consideration of a variety of issues. The extraterritorial application of criminal law and the exercise of criminal jurisdiction in space are in search of a proper connecting factor so that a relevant State law and jurisdiction can be applied. Scholars are divided on using either nationality of the offender or victim or registration of space objects as the connecting factor to apply criminal law and exercise jurisdiction. The nationality-based approach proposes that, regardless of where the space object is registered, criminal law should be enforced depending on the nationality of the individuals participating in the illegal act. This strategy adheres to the established idea that a nation's laws are applicable to all of its residents, wherever they may be. In other words, this approach adheres to one of the most basic principles of classical international law—that international law would not interfere with the relationship between a sovereign state and its nationals. However, in cases involving multi-national space missions, this approach may present difficulties in determining jurisdictional issues. Moreover, there is also a divide between the active personality and passive personality principles for applying nationality as a connecting factor since the former goes by the nationality of the offender and the latter advocates for the nationality of the victim.

The registration-based approach, on the other hand, suggests that criminal law be implemented based on the registration of the space object participating in the illegal action. If this approach were to be followed, the criminal act would be under the jurisdiction of the country of registration of the space object on which the crime is committed. In disputes involving space objects owned by commercial corporations or multinational organisations, proponents of this approach argue that it offers clearer rules and is the least controversial principle for the determination of applicable law and jurisdiction. In other words, this approach may be better suited for the present purposes because space missions frequently involve astronauts and employees from multiple countries. However, there may be jurisdictional gaps in situations where criminal behaviour is directly connected to a specific person or group of people rather than the space object itself. Further, this approach might not fully address circumstances in which criminal activities are carried out by parties outside the registered space object, such as cyber-attacks on spacecraft or distant operations impacting space missions. Traditional ideas of territorial jurisdiction may

© [Author(s)] — Published in *Lex ad Coelum* with permission.

not be adequate in these situations to prosecute the offenders. The lack of legal precedents further exacerbates the jurisdictional ambiguity surrounding unlawful conduct in space. In addition to this, we must not forget that the field of space law is still relatively new and continually developing, and due to the lack of established legal frameworks, decision-making becomes more difficult.

Existing Legal Framework

In the interim, till a comprehensive framework is developed for the purpose of regulating criminal activities in space, we may make use of the existing frameworks to decide issues relating to applicable law and jurisdiction. For this purpose, we may reconcile and interpret the Intergovernmental Agreement on the International Space Station (hereinafter "IGA") and specific provisions of the Outer Space Treaty in a manner that would allow us to determine the questions concerning criminal activities in space. Unfortunately, neither IGA nor Outer Space Treaty addresses the question of applicable law separately rather, they confine themselves to jurisdictional issues.

IGA provides detailed rules concerning jurisdictional issues in relation to criminal misconduct in space. In cases involving individuals from the same nation, Article 22(1) of the IGA specifically states that parties to the said agreement may "exercise criminal jurisdiction over personnel in or on any flight element who are their respective nationals." In cases where the misconduct "….(a) affects the life or safety of a national of another Partner State or (b) occurs in or on or causes damage to the flight element of another Partner State", IGA provides for a consultative process under Article 22(2). It provides that the affected Partner State may request a consultation with the Partner State to whom the alleged perpetrator belongs concerning their respective "prosecutorial interests." It further provides that the affected Partner State may exercise criminal jurisdiction against the alleged perpetrator if the Partner State whose national is the alleged perpetrator fails to either "(1) concur in such exercise of criminal jurisdiction, or (2) provide assurances that it will submit the case to its competent authorities for the purpose of prosecution." Article 22(4) further mandates that each Partner State has to cooperate and assist other Partner States in relation to misconduct in orbit.

In addition to the IGA, Outer Space Treaty also provides under Article VIII that the jurisdiction and control over space objects and personnel thereof shall lie with the

© [Author(s)] — Published in *Lex ad Coelum* with permission.

nation on whose registry that object is registered. This combines personal jurisdiction with quasi-territorial jurisdiction on the basis of registration as the connecting factor. Interestingly, it does not consider nationality even in conferring personal jurisdiction over the personnel of space objects.

The above discussion on IGA and the Outer Space Treaty shows how a mixed approach needs to be followed concerning issues relating to the scope and contours of criminal law in space. It requires us to follow the nationality principle in conjunction with the principle relating to the registration of objects. However, this may not essentially work in the long run as there is every possibility of conflict between nationality and registration as connecting factors in future space crimes. The framework discussed above, with reconciling connecting factors, may be used as an inspiration to develop more comprehensive rules and guidelines governing criminal misconduct in space. This is not an easy task, given the unwillingness of States to involve themselves in the consultative processes to come to an agreement on their respective prosecutorial interests.

Conclusion

As space activities continue to advance, the need for a more robust and comprehensive legal framework becomes increasingly evident. Establishing a dedicated body of space criminal law, informed by international cooperation and consensus, is crucial for addressing current ambiguity in the determination of applicable law and jurisdiction. Additionally, international collaboration among space-faring nations is essential to create a cohesive legal framework that ensures accountability and upholds justice in the ever-expanding frontier of outer space. Addressing this issue requires a collective effort from the international community to develop a comprehensive and coherent legal framework that caters specifically to the challenges of space crimes. Only through cooperation, innovation, and dedication we can create a system that ensures that justice prevails in the uncharted and rapidly evolving frontier of outer space.

Notes & References

© [Author(s)] — Published in *Lex ad Coelum* with permission.

* The author is a Junior Associate at the Chamber of Tushar Mehta, Solicitor General of India. The author would like to thank Prof (Dr) Sandeepa Bhat for his valuable feedback and suggestions.

© [Author(s)] — Published in *Lex ad Coelum* with permission.

SOVEREIGNTY IN SPACE: CHANGING DIMENSIONS

Kaushik H.M.[*]

Keywords: Jurisdiction – Outer Space Treaty – Property rights – *Res communis* – *Res nullius*

Introduction

It is perhaps a tragedy of the human condition that governing nature has been an easier task when compared to governing human behaviour. The rate of evolution of technology has always outpaced changes in legal and ethical norms; labour laws could never keep up with industrialization, and privacy laws are still playing catch up to data science. As the degradation of Earth continues for various reasons including technological ones, there is an emerging intersection between science and politics. Space exploration is one such intersection.

The exploration of space is not only an act of adventure but also one of survival. Along with numerous ethical conundrums, space exploration poses great legal challenges. If space ought to be accessible to the whole of humanity, there needs to be a way for the international community to overcome its fragmented nature (if at all that is possible). This write-up tries to investigate the relationship between nation-states, sovereignty and space exploration. It aims to make three arguments in this context. First, that the current position of international law which bars nation-states from claiming sovereignty in space is unlikely to hold its ground for too long. Second, that there is a strong relationship between property rights and sovereignty which international law cannot separate. Finally, that there is a possibility of establishing a harmony between interests of nation-states in space with the collective interests of the human community.

Current Position of International Law

Outer Space Treaty, 1967 is the most significant treaty concerning space exploration. Article I of the Treaty lays down the purpose for which nation-states can explore outer space. It states that exploration must be conducted for the benefit of all countries regardless of the extent of their economic and scientific development. The essential inference from this Article being that parties to the Treaty agree that space

© [Author(s)] — Published in *Lex ad Coelum* with permission.

is *res communis* or a variant of it, that is, belonging to everyone, and not *res nullius,* that is, belonging to no one. This doctrinal distinction has major ramifications for the trajectory of international space law as both these doctrines signify some form of commonality among humans in their relationship with space but differ in regards to the basis of their commonality. This leads us to a significant question: if space belongs to everyone, who has sovereignty over it? Article II of the Outer Space treaty exclusively denies nation states to make any claim of sovereignty. If sovereignty refers to the exclusive, ultimate authority within a territory; does it then follow that any demarcation of territory in outer space for practical purposes would make claims of sovereignty inevitable?

Before addressing this question, let us look at the development of the law of the seas, which also began its journey on the premise of *res communis.*

The Law of Seas and Space Exploration

The earliest claim of sovereignty in the seas was made in the decrees passed by Pope Alexander after the discovery of various sea routes by Columbus. The decrees stated that one part of the discovery would belong to Spain and the other to Portugal. In opposition to the decree and perhaps to enable the English to sail in waters, it is believed that it was Queen Elizabeth I who first proclaimed that the seas are free to all nations. With the subsequent work of Grotius among others, there was a growing international consensus regarding the free nature of the seas. However, with the emergence of nation-states and stronger naval powers, protection of territorial integrity took primacy over freedom of the seas. This led to nations claiming sovereignty over a part of the seas around their land. Many international conflicts today are conflicts concerning the sovereignty over seas, something which nation-states realize is beneficial for strategic purposes as well as for the massive access to resources which the seas provide.

This partial transition of the seas from the domain of *res communis* to the domain of sovereignty is of great value in our study of international space law. As space exploration is at its infancy, self-interest of nation states is currently hidden behind technological constraints. The moment extraction of resources and its transportation from outer space to Earth becomes a scientific reality, nation-states will find a strong nexus between exploration of space and fulfilling their obligations to citizens. This

© [Author(s)] — Published in *Lex ad Coelum* with permission.

argument is strengthened by the current international practice around satellites. Article VIII of the Outer Space Treaty permits states to retain control over any object registered in that state, including satellites, however, recent developments in the governance of international telecommunication suggests that states can also appropriate (though in practical terms) the entire orbital space in which the satellites orbit the Earth. Essentially, this creates a causal chain between the ownership of objects and its purpose, and subsequently a claim over space itself, if it is sufficiently tied to the said purpose.

This brings us to the next question, can having jurisdiction over objects, persons and events in space be construed as having sovereignty in space?

Jurisdiction and Sovereignty

The current position of international law with regards to jurisdiction and sovereignty in outer space is clear; states have jurisdiction over objects and persons belonging to the state (*rationeinstrumenti and ratione personae)* but have no claim of sovereignty. However, there are gaps in the current law that allows for claims of jurisdiction to turn into a backdoor entry for claims of sovereignty. For instance, Article 9 of the Moon Agreement, 1979 allows for preservation of manned and unmanned stations by merely "notifying" the UN Secretary-General. Though there is also a mandate to limit the use of area on Moon to only fulfil the "needs of the station", the introduction of a subjective element like "need" is likely to allow states to gain control over areas far beyond what the law intends to permit. This problem would magnify when stations of multiple nations are placed close by, perhaps near a resource rich site. The only way to resolve conflicts arising out of such circumstances would be to then make territorial demarcations of some kind. Now, let us add all these elements together; if there is a marked territory on a celestial body, a population of astronauts, governance of the territory and personnel, and consensus with other nations who want to make similar claims, we end up fulfilling all the criteria needed for statehood as laid down in the Montevideo Convention,1933.

This transition from jurisdictional control to territorial control is a real possibility that international space law has not yet contended with.

© [Author(s)] — Published in *Lex ad Coelum* with permission.

Property Rights and Sovereignty

In the previous section, we have investigated the relationship between jurisdiction and sovereignty, in this section we will take a different starting point.

It is important to note that Article II of the Outer Space Treaty which prohibits nation-states from having any form of ownership on celestial bodies, does not clarify its position of individual appropriation of celestial bodies. If states themselves do not have ownership, do they have any right to stop individuals from making ownership claims? The supreme court of U.S had to answer the same in *Nemitz v. United States,* wherein the appellant claimed ownership over an asteroid based on the premise that he had asserted his natural right over an unowned property through an online registration platform, and thereby, could sue the government for landing a space object on the asteroid without his permission. The state in response argued that neither was there any constitutional or statutory basis for his argument nor was there any use and occupation of the territory to create any real interest in the property. Conversely, it would mean that use and occupation of land along with a natural right to do so would be the necessary conditions for possessing property rights on celestial bodies. All unclaimed territory on Earth is claimed through the same means, or as John Locke would argue, mixing one's labour with property would create rights in it as everyone is entitled to fruits of their own labour. This leads us to another significant question; on what basis does international law make a distinction between unclaimed territory on Earth and in outer space? If there is no material and philosophical distinction between Earth and other celestial bodies, there is an argument to be made to perceive celestial bodies as a mere extension of Earth severed by the vacuum of space in between, similar to how nations and continents are separated only by the intervention of water bodies.

It is necessary for international law scholars to address these philosophical questions to strengthen the laws position on private property rights in space, an issue that is likely to arise when private organizations like SpaceX and Blue Origin get closer to realizing their dream of extensive commercial space tourism and laying their hands on celestial bodies.

Conclusion

© [Author(s)] — Published in *Lex ad Coelum* with permission.

The tension between the doctrine of *res communis* and the object of space exploration is not illusory and international law must not pretend that it is. There is no good reason to believe that international law can prevent the transmission of ideas such as national sovereignty and capitalism to outer space for the simple fact that they are human enterprises and not mere territorial particularities. The more pragmatic goal for international law would be to create laws and institutions which would minimize the harms of these enterprises. This may include formation of multinational authorities that give substantial decision-making power to members from less developed countries, separation of space colonies from origin state, training of astronauts from diverse regional backgrounds, conditional resource extraction, resource sharing policies and so on.

Notes & References

* Affiliated Institution: Jindal Global Law School, Sonipat.

© [Author(s)] — Published in *Lex ad Coelum* with permission.

CISLUNAR SPACE STRATEGY IN LIGHT OF THE OUTER SPACE TREATY

Thomas Paul Kanatt[*]

Keywords: Appropriation – DARPA – Human presence – Militarize – Outer Space Treaty

The Artemis Accords, which got publicized in 2020, marked a new phase in the United States space policy with the mission of sending crewed missions to the Moon and beyond. Whilst many debates had arisen regarding this Program, the United States was looking for the next big thing in space to assert its supremacy and leadership in space. In pursuance of this, the government released a "National Cislunar Science and Technology Strategy," (NCST) in November 2022, which consists of a document that would guide the actions of the US Government in advancing science, exploration and economic development activities in the Cislunar space.

This blog seeks to critically examine this strategy in light of the internationally accepted Treaty on Principles Governing the Activities of States in the Exploration and use of Outer Space, including the Moon and other Celestial Bodies commonly called as the Outer Space Treaty.

Essence of the NCST

Cislunar space is the space beyond Earth's geosynchronous orbit which is under the gravitation influence of both the Earth and the Moon. This includes the Lagrange points, the trajectories utilizing these regions and the Lunar surface.

The Cislunar space is of critical importance for developing space infrastructure, space resource mining, lunar exploration and more importantly for establishing a domain for national security. It also offers an opportunity to enable crewed exploration to Mars and beyond. In fact, the U.S. Government estimates that the level of human activity in Cislunar space over the next decade could exceed everything that has happened there between 1957 and today, combined. The ultimate aim of these objectives is to achieve development in Cislunar Space with the leadership of U.S. playing a central role.

© [Author(s)] — Published in *Lex ad Coelum* with permission.

With this strategy in mind, the document devises 4 main objectives in the early years of Cislunar growth:

1. Support research and development to enable long term growth in Cislunar space.
2. Expand international science and technology cooperation in Cislunar space.
3. Extend U.S. space situational awareness capabilities into Cislunar space.
4. Implement Cislunar communications, positioning, navigation and timing capabilities with scalable and interoperable approaches.

Intent to Militarize

As part of their aim to enable an enduring human presence in Cislunar space and resource utilization in Moon, the US is looking to develop capabilities like manufacturing of components from in-situ materials, autonomous assembly of structures in space and construction of structures that maximize the use of in-situ materials. On the same note, the Defense Advanced Research Projects Agency (DARPA) had released the Novel Orbital Moon Manufacturing, Materials, and Mass Efficient Design (NOM4D) program, which seeks to establish off-earth manufacturing by producing structures in outer space. Therefore, in essence, the NOM4D Program by DARPA fulfils the first objective of the Cislunar space objectives of supporting emerging technologies to enable long term growth in Cislunar space.

However, Article IV of the Outer Space Treaty advocates for using the moon and other celestial bodies exclusively for peaceful purposes. It also prohibits the establishment of any military bases, installations and fortifications on celestial bodies. DARPA is an agency of the US Department of Defense for the development of technologies to be used by military forces to enhance national security. Therefore, any endeavor by this agency will only be viewed by other countries as a statement of intent to militarize the moon, thereby, violating Article IV of the Outer Space Treaty. This makes the NOM4D program inconsistent with the country's commitments under the Treaty.

© [Author(s)] — Published in *Lex ad Coelum* with permission.

Claims of Appropriation

As part of the US Government's plan to enable long term growth in Cislunar space, the US Government intends to partner up with private entities, many of whom in this regard have already published their objectives for operating in Cislunar Space. The provisions of the NCST endorse the government to build sustainable habitats on planetary surfaces to support an enduring human presence. In pursuit of this, private companies like United Launch Alliance have already laid out their vision for Cislunar Space development, which focuses on constructing human habitats not just for scientific research but also for tourism objectives.

However, the US Government's plans of operating in the Cislunar space traverse the scope of the basic intent of Article II of the Outer Space Treaty, which prohibits any claim of appropriation. In this context, the word appropriation relates to a taking which involves more than a temporary or casual occupation of land. The intent of the US Government in partnering with private entities to build a permanent settlement on a planetary body for its own use constitutes a claim of appropriation, thereby violating Article II of the Outer Space Treaty.

Benefit and Interest of all Countries

The exploits of the US government additionally violate Article I of the Outer Space Treaty, which mandates the exploration and use of outer space and celestial bodies for the benefit and in the interests of all countries. Article I also guarantees free access to all areas of celestial bodies to all States. By appropriating property for itself and by building long term habitats, the US is effectively excluding access for other countries over those areas. This further bolsters the argument of appropriation against the United States in violation of Article II of the Outer Space Treaty.

As asserted by Rene Mankiewicz, anything taken from the Moon has to be used for the benefit and interest of the whole of mankind and not just that of a single nation. Objective 1 of NCST facilitates the development of lunar surface technologies and resource assessment technologies to enable an enduring human presence on the Moon. However, there has been no mention of sharing the benefits with other nations through such activities. Even though an argument could be made that Objective 2 of the NCST assuages this concern by facilitating engagement with other

© [Author(s)] — Published in *Lex ad Coelum* with permission.

countries, a careful reading of the document suggests otherwise. Objective 2 specifically mentions pursuing engagement with other nations only in certain areas of science and technology like debris mitigation, collision avoidance and flight safety. Moreover, past practice shows that ownership would eventually be asserted over resources that are extracted by the United States from the Moon. Such individual claims of ownership do not satisfy the requirements under Article 1 of the Outer Space Treaty in terms of carrying on exploration of the Moon for the benefit and in the interest of all countries, thereby violating the Treaty.

Underlying Scheme

The basic purpose behind the NCST is projected as the advancement of science and exploration in the Cislunar area, however a deeper reading of the objectives would reveal otherwise. Article 1 of the Outer Space Treaty only sanctions exploration and use of lunar resources for scientific investigation; however, the present objectives of the NCST go far beyond the use for scientific purposes, and extend to exploitation of the resources for long term habitation and other operations on the Moon. As part of this strategy, the US government envisions other private entities operating in the Cislunar Space and as a part of its longer term goal, it foresees a 'Cislunar Ecosystem'. This 'Cislunar ecosystem' involves utilization of reserves on the moon as resources for extraction and for supporting other activities that are of a permanent nature on the moon.

The above discussion indicates that the underlying scheme of the NCST does not respect the essence of both Article I and II of the Outer Space Treaty. Since the aim would eventually be to enable a long term human presence, supported by the utilization of resources on the moon and construction of permanent structures and habitats, the respect for benefits and interest principles and non-appropriation principle is difficult to prove.

Concluding Remarks

Cislunar space offers a lot of opportunity and potential for future growth; however, any activity pursued there must be carefully monitored to be in compliance with treaty obligations of States. The NCST poses serious questions on the compliance of the United States' obligations under the Outer Space Treaty. Hence, the objectives

© [Author(s)] — Published in *Lex ad Coelum* with permission.

should be streamlined and amended to ensure that the partnership with private entities does not result in contravention of international legal obligations.

Notes & References:

[*] Pursuing BA/LLB (Hons.) at National Law University, Jodhpur.

1. Virgiliu Pop, 'Appropriation in outer space: The relationship between land ownership and sovereignty on the celestial bodies', *Space Policy*, Vol. 16, Issue 4, 2000, pp. 275 – 282.
2. Mankiewicz R., 'Interventions with respect to permanent stations on the Moon', *Proceedings of the Eleventh Colloquium on the Law of Outer Space*, 1968, p. 163.
3. Alan Wasser & Douglas Jobes, S'pace Settlements, Property Rights, and International Law: Could a Lunar Settlement Claim the Lunar Real Estate It Needs to Survive', *Journal of Air Law and Commerce*, Vol. 73, Issue 1, 2008, pp. 37 – 78.
4. Marc-Andre Chavy-Macdonald, *et al.*, 'The cis-lunar ecosystem — A systems model and scenarios of the resource industry and its impact', *Acta Astronautica*, Vol. 188, 2021, pp. 545 – 558.

© [Author(s)] — Published in *Lex ad Coelum* with permission.

CHANDRAYAAN – 3: AN OPPORTUNITY TO SET RIGHT THE MISTAKE OF ARTEMIS ACCORDS

Prof. (Dr.) Sandeepa Bhat B.[*]

Keywords: Artemis Program – Chandrayaan-3 – Common rights' regime – Outer Space Treaty – Soft landing

Chandrayaan – 3: An Accomplishment to Cherish

Among all odds and speculations, India successfully made a soft landing on the moon on 23 August 2023. The previous experience of Chandrayaan – 2's failure to have soft landing of the lander and the rover was haunting the entire nation till the last minute. Though Chandrayaan – 2 was successful in placing the lunar orbiter as intended, lunar landing remained an uncherished dream of the Indian Space Research Organisation (ISRO). Chandrayaan – 3 could successfully land the Vikram lander and the Pragyan rover near the South Pole region of the moon. Though India is the fourth State after Russia, the United States and China to land on the moon, it is the first to land near the South Pole of the moon. The Pragyan rover has already made several discoveries that are of immense scientific significance. Hence, Chandrayaan – 3 has garnered great attention of the international community, including that of space-faring nations.

The soft landing of a space object on the moon dates back to 1966 when the erstwhile Soviet Union's Luna 9 made the first soft landing on the moon. This triggered a race between the Soviet Union and the United States, which ultimately resulted in "one giant leap for mankind", the first human landing on the moon in 1969. Despite the lunar landings have started more than five decades ago, technological developments in both the United States and Russia have not reached a level, which is beyond uncertainties. This is reflected in Russia's recent failure to land Luna 25 on the moon, which was supposed to land in the South Pole region of the moon on 21 August 2023. The fact that India could able to land successfully during the same week makes the achievement special. It is also a reflection of the fact that India is now a force to be reckoned with in terms of activities on the moon and other celestial bodies.

© [Author(s)] — Published in *Lex ad Coelum* with permission.

Celestial Mining and Artemis Accords

The twenty-first century developments in the space sector are moving too much in the direction of commercialisation. We have gone beyond the use of earth orbits for commercial activities, like direct television broadcasting, remote sensing, telecommunication, navigation, etc., to grab and exploit the celestial resources. Some States have also structured their domestic laws to provide legal sanctity for celestial resource exploitation. The United States, Luxemburg, United Arab Emirates and Japan have already enacted such laws to permit celestial mining. Saudi Arabia has also shown its strong zeal in this direction by depositing a notification with the United Nations for its withdrawal from the Moon Agreement 1979. In November 2022, Japan went on to authorise iSpace, a private company, to conduct commercial activities on the moon and sell resources for profit.

While these developments were taking place in the domestic legal positions of some States, the United States has come up with a bigger plan in the form of Artemis Accords in 2020. The Artemis Accords carry 13 provisions for cooperation in the civil exploration and use of celestial bodies. They are characterised as non-binding understanding between the participating States to ensure the smooth conduct of activities on celestial bodies. Interestingly, the Artemis Accords has been signed by various authorities ranging from representatives of respective State's space agency to some ministers or even ambassadors for different States.

The Artemis Accords are a part of the National Aeronautics and Space Administration's (NASA)Artemis Program, which involves a stage-by-stage journey toward celestial bodies. In this connection, NASA has successfully launched Artemis 1, which involved the exploration around the moon and return to earth to ensure that the technology is adequate enough for safe journey to lunar orbit. The next two Artemis missions are intended to perform human lunar flyby and human landing respectively. The Artemis Program also dreams of constructing a lunar orbital station- lunar 'Gateway', and a self sustaining base on the moon- 'Artemis Base Camp'.

An Indian Mistake

© [Author(s)] — Published in *Lex ad Coelum* with permission.

After the Artemis Accords were signed by the initial signatories, the efforts to increase the number of participating States got intensified. Two other major space-faring nations, Russia and China, have rejected to concede the Artemis Accords. Instead, they have teamed up to have a parallel joint project in the form of the International Lunar Research Station. India kept itself away from the Artemis Accords for nearly three years. However, after a wait and watch game, it became the twenty seventh signatory to the Artemis Accords on 21 June 2023 when the Indian ambassador to the United States, Mr. Taranjit Singh Sindhu, signed it on behalf of India.

Keeping aside any political consideration, this is a move that India should have never played from the legal standpoint. The Artemis Accords and its umbrella cover of the Artemis Program are in direct violation of international space treaties' obligations. Though there are multiple contradictions with the provisions of the Outer Space Treaty, the author would like to highlight the most significant of all for the purpose of this blog piece, which is indisputably the violation of the principle of non-appropriation.

The Outer Space Treaty is the reflection of the common rights' regime, which originates from the universal understanding that space resources are bounties of nature and everyone should have rights in them. The need for carrying out the exploration and the use of outer space and celestial bodies for the benefit and in the interests of all countries, along with equality of access to all areas and freedom of scientific investigation to all, stand as the foundational principles in this regard under Article I of the Outer Space Treaty. Article II of the Outer Space Treaty carries forward the elements of common rights' regime by prohibiting national appropriation of outer space and celestial bodies "by claim of sovereignty, by means of use or occupation, or by any other means." Despite the common rights' regime is taken to the next level under the Moon Agreement 1979 with the incorporation of the common heritage of mankind, its practical implication has taken a backseat due to the limited ratification of the Moon Agreement.

These principles of common rights' regime have taken shape in space law due to the relentless efforts of the third world States.[1] With the failure of the Moon Agreement, Article II read with Article I of the Outer Space Treaty remained as the sanctum sanctorum of the common rights' regime in space law. Sections 9 and 10 of the

© [Author(s)] — Published in *Lex ad Coelum* with permission.

Artemis Accords pose serious challenges to these principles of common rights. Section 9 stipulates the preservation of outer space heritage without outlining how encompassing such a right of preservation will be. This is dangerous as the measures taken in preserving space heritages will be subjective and might result in creating monopolistic rights in contravention of common rights' regime.

Section 10 is of greater concern as it advocates for laying hands on celestial resources for commercial exploitation. It is based on the wrong presumption that the Outer Space Treaty does not deal with celestial resources. The legal uncertainty of Section 10 is evident in the provision itself as the drafters stipulate this as not a contravention of Article II of the Outer Space Treaty. It is unbecoming of any international instrument, legal or otherwise, to include such an unwarranted justification for a provision unless there exists an inconsistency. Commercial utilisation of celestial resources by select few States under the garb of the Artemis Accords undoubtedly amounts to national appropriation by "use" or by "other means" contrary to the essence of Article II of the Outer Space Treaty. This is also at odds with India's historic stand against individual appropriation evident in its United Nations deliberations during 1970s. It is significant to note here that along with Egypt and Nigeria, India had opposed the United States' position on resource exploitation in 1974.[2] Now, signing Artemis Accords indicate a U-turn in the Indian assertion of third world approach, and more dangerously, acceding the US imperialism.

What Next?

This is not the time for repenting on whatever has happened. This is the time for carrying forward by accepting the current position of India being a part of the Artemis Accords. We have to assess and revaluate the Artemis Accords as well as its bigger counterpart of Artemis Program to bring them in tune with the common rights' regime. The most significant step in this direction is to shift the spirit of bilateralism or plurilateralism of the Artemis Accords to multilateralism by involving all States in negotiating an acceptable regime for celestial resources. For this, bridging the gap between Artemis Accords and Lunar Station project as well as taking the confidence of developing and less developed States are crucial. We should take lessons from the unilateralism of the United States in the deep seabed exploitation to collectively condemn the extension of it to celestial resources. Our achievement

© [Author(s)] — Published in *Lex ad Coelum* with permission.

of Chandrayaan – 3 should be viewed as a tool for having an independent say to uphold the integrity ofthe common rights' regime in international space law.

Notes & References:

[*] Professor of Law, Director – Centre for Aviation and Space Laws, The WB National University of Juridical Sciences, Salt Lake City, Kolkata.

[1] Robert J. Griffiths, 'From the Ocean Floor to Outer Space: The Third World and Global Commons Negotiations', *Journal of Third World Studies* , Vol. 9, No. 2, 1992, pp. 375 – 389.

[2] Stephen D. Mau, 'Equity, the Third World and the Moon Treaty', *Suffolk Transnational Law Journal*, Vol. 8, No. 2, 1984, pp. 221 – 258 at p. 250.

© [Author(s)] — Published in *Lex ad Coelum* with permission.

FROM HESITATION TO ENGAGEMENT: INDIA'S PATH TOWARDS GLOBAL AVIATION SUSTAINABILITY

Kiran Mohan Vazhapully[*]

Keywords: Carbon footprint – Carbon neutrality – CORSIA – SAF – UNFCCC

In global aviation, the narrative of soaring across geographical expanses carries with it the underlying subplot of a growing carbon footprint. As India propels its economy forward, its aviation sector has echoed this global narrative, contributing to the carbon trail etched across the skies. Over the past two decades, emissions from international aviation have escalated by almost 130%, causing a ripple of concern among climate advocates. Despite advancements in fuel efficiency, projections indicate a steep rise in aviation emissions, estimating a 7 to 10-fold increase by 2050 compared to 1990 levels. This looming spectre underscores the critical need for collaborative international initiatives to mitigate aviation's carbon emissions.

Amidst this backdrop, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) unfolds as a significant endeavour developed and managed by the International Civil Aviation Organization (ICAO). CORSIA, envisioned as a global market-based measure, aims to stabilise CO2 emissions at 2020 levels by mandating airlines to offset their emissions growth post-2020. The scheme is executed in phases: a pilot phase (2021-2023), a voluntary phase (2024-2026), and a mandatory phase from 2027 onwards, with certain exemptions.

The global aviation community has showcased a collective resolve with 126 States, as of November 2023, volunteering for CORSIA from its inception. While CORSIA has garnered a broad consensus, criticisms concerning its efficacy in spurring direct emission reductions within the aviation sector are notable. However, the collaborative ethos among 126 States underscores a global urgency to act, heralding a step towards broader environmental sustainability.

The discourse surrounding CORSIA transcends environmental conservation, delving into the realms of international diplomacy and economic deliberations. For India, with its burgeoning aviation sector, the scheme presents both a challenge and

© [Author(s)] — Published in *Lex ad Coelum* with permission.

an opportunity in its quest for carbon-neutral growth. This narrative unfolds against a backdrop of national aspirations intertwined with global climate change mitigation commitments, setting the stage for a nuanced exploration of India's evolving stance towards CORSIA compliance.

From Reluctance to Readiness

India's initial stance towards CORSIA was tinted with caution, reflecting a narrative of balancing its burgeoning aviation sector's growth with global environmental responsibility. Central to this cautious approach were concerns regarding the scheme's alignment with the United Nations Framework Convention on Climate Change (UNFCCC) principles, particularly the principle of "common but differentiated responsibilities." This principle, which recognises that different countries have different abilities and histories of emissions, seemed to clash with CORSIA's one-size-fits-all compliance requirements.

Furthermore, the financial ramifications of CORSIA were a source of concern. Although aimed at advancing sustainability, the offsetting requirements were perceived as a potential financial burden that could impede the growth of India's aviation sector, a crucial engine for economic development and connectivity across the country.

However, the narrative began to evolve with India's growing engagement in global climate dialogues. A notable shift was marked by the recent announcement from the Minister of Civil Aviation, Jyotiraditya Scindia, regarding India's decision to participate in CORSIA and the Long-Term Aspirational Goals (LTAG) from 2027. This announcement, made during a meeting of the Parliament's Consultative Committee of the Ministry of Civil Aviation, signalled a thoughtful transition in India's stance.

The rationale behind this phased engagement was to allow airlines from developing States like India ample time to thrive, mitigating any adverse financial implications due to CORSIA. By aligning with the mandatory phase of CORSIA, India has positioned itself within the global effort to curb aviation emissions while also providing its aviation sector a window to bolster its capacities and prepare for the upcoming compliance requirements.

© [Author(s)] — Published in *Lex ad Coelum* with permission.

This decision embodies a balanced approach, showcasing India's commitment to global climate goals while safeguarding its domestic interests. The participatory stance from 2027 also aligns with the broader objective of ensuring that the financial implications of CORSIA do not thwart the growth trajectory of India's aviation sector.

The evolution of India's stance towards CORSIA mirrors a broader endeavour to meld economic growth with environmental sustainability. This narrative reflects a pragmatic approach, cognizant of financial realities yet aligned with the global impetus towards carbon-neutral aviation. Through this lens, India's engagement with CORSIA offers a vantage point to appreciate the complex interplay of economic and environmentalconsiderations shaping the discourse on sustainable aviation in a developing economy.

The Synergy between National Policies and Global Initiatives

The narrative of sustainable aviation in India has been evolving, showcasing a blend of national policy frameworks and international engagements. On the domestic front, the National Policy on Bio Fuels, 2018 marked a significant stride towards decarbonising the aviation sector. Envisaged by the Ministry of Petroleum and Natural Gas (MoPNG), this policy laid the foundation for India's Bio-Aviation Turbine Fuel (ATF) Programme, focusing on promoting clean fuel usage in aviation. The Bio-ATF Programme Committee, under this policy, has been instrumental in advancing various facets of sustainable fuel development, encompassing raw material production, technology adoption, standard setting, and engine performance evaluation.

Furthermore, the interest in Sustainable Aviation Fuel (SAF) initiatives among Indian carriers is a promising sign. Spicejet, Indigo, and Vistara have demonstrated their commitment towards reducing carbon emissions through experiments with SAF blends. For instance, Spicejet's demonstration flight operated with a 25% SAF blend, while Vistara and Indigo conducted ferry flights using significant SAF blends, signifying a step towards cleaner fuel alternatives.

On the global stage, India's engagement in ICAO's Assistance, Capacity Building and Training for Sustainable Aviation Fuels Programme reflects its intent to foster

© [Author(s)] — Published in *Lex ad Coelum* with permission.

knowledge exchange and build capacities for transitioning towards SAF. This international engagement is in line with India's pursuit of harmonising national regulations with global standards, as reflected in the adoption of ICAO's guidelines for environmental protection within the Civil Aviation Regulations (CARs). These regulations encompass a spectrum of environmental measures, including emissions standards, noise control, and sustainable fuel utilisation, mandating compliance within Indian aviation sector. This regulatory alignment not only facilitates India's commitment to environmental stewardship but also strengthens its capability to meet the objectives of global sustainability programs such as CORSIA.

Moreover, the initiatives by the Directorate General of Civil Aviation (DGCA) and the Airports Authority of India (AAI) towards carbon neutrality exhibit a coherent approach to environmental protection in aviation. The efforts towards achieving 'Carbon Neutrality' and 'Net Zero' accreditation by various airports in India align with global environmental standards, showcasing a concerted effort to meld national aspirations with global sustainability goals.

Building upon the strong foundation laid by the DGCA and AAI's strategic policies for carbon neutrality, the aviation sector's embrace of cutting-edge technologies like the Central Air Traffic Flow Management system further demonstrates India's multi-faceted approach to achieving its environmental and economic objectives. By orchestrating air traffic with precision, India has not only curtailed fuel consumption but also significantly cut down greenhouse gas emissions, reflecting a meticulous blend of operational efficiency and environmental consciousness.

Parallel to these technological strides, Indian airports have actively engaged in the Airport Carbon Accreditation programme. This global initiative has enabled airports nationwide to systematically manage and reduce their carbon emissions. Through a multi-tiered certification process, Indian airports are progressively advancing their carbon management capabilities, with Delhi and Mumbai airports leading the charge, having attained the pinnacle Level 4+ Carbon Accreditation. This achievement echoes India's broader aim to power its airports entirely with Green Energy by 2024 and to reach Net Zero emissions by 2030.

Even as India's aviation infrastructure is poised for expansion, with the number of airports projected to rise to 220 in the near future, the dedication to sustainable

© [Author(s)] — Published in *Lex ad Coelum* with permission.

practices continues unwaveringly. The ambition to establish over 90 carbon-neutral airports by 2024 is illustrative of this commitment. The drive towards carbon neutrality is all-encompassing, extending from the macro objectives of infrastructural development to the micro strategies such as electrifying ground support vehicles.

Cochin International Airport, fully powered by solar energy, has already carved a niche for itself as a global pioneer. This stride towards renewable energy use is not an isolated one but part of a concerted effort by the government to ensure that all airports can meet their energy needs in an environmentally sustainable manner. The emphasis on solar power is not just about harnessing clean energy but also about catalysing a paradigm shift towards a greener aviation ecosystem.

These endeavours are not simply about reducing carbon footprints but redefining the fabric of India's aviation industry. They reflect a paradigm where economic growth and environmental sustainability are not parallel paths but converge towards a singular vision of a sustainable future. It is a narrative where airports are not just transit points but catalysts for eco-friendly development, embodying the ethos of a new India that aspires to grow responsibly.

Concluding Thoughts

This unfolding narrative showcases the convergence of national policies and global endeavours fuelling sustainable aviation in India. The proactive policy environment, coupled with active international engagements, positions India as a responsive and responsible player in the global arena. The evolution from initial reluctance towards CORSIA to a structured engagement and the intertwining of national and global initiatives underscores India's measured approach to navigating the complex landscape of aviation sustainability amidst its economic growth aspirations. Through this balanced approach, India is establishing a framework that other developing States can observe and learn from, demonstrating the feasibility of simultaneously pursuing economic growth and environmental sustainability within the aviation sector for a more eco-conscious future.

Notes & References:

© [Author(s)] — Published in *Lex ad Coelum* with permission.

[*] *Kiran Mohan Vazhapully is Senior Legal Officer at the Secretariat of Asian-African Legal Consultative Organization (AALCO), an intergovernmental organization based in New Delhi. Views are personal.*

© [Author(s)] — Published in *Lex ad Coelum* with permission.

ICAO'S APPROACH TO ADDRESS AVIATION POLLUTION: A CRITICAL ANALYSIS

Dr. Aruna Kammila[*]

Keywords: Civil Aviation Policy – CORSIA – DGCA – ICAO – Standards and Recommended Practices (SARPs)

Introduction

The aviation sector represents one of the most essential and profitable businesses in the contemporary world. This soaring industry commands nearly 3.6% of the world's Gross Domestic Product (GDP), exhibiting the industry's importance to the modern economy. It is projected to see massive growth in the coming years. It provides for over 65 million jobs worldwide, equivalent to the entire population and the economy of the United Kingdom. Human civilisation has come so far that we have found innovative and more efficient ways to travel worldwide and keep the global supply chain running rust-free.

India has been a growing force in the civil aviation arena and is amongst the fastest-growing markets in the world. The Ministry of Civil Aviation (MoCA) and the Directorate General of Civil Aviation (DGCA) are India's governing and regulatory authorities for this domain. Around $35 billion has been contributed to the nation's GDP by this sector already in the past. It is expected to grow more, thanks to the enhanced connectivity due to the 'UDAN' scheme, which is mandated to enable affordable access to air travel and improve the economic condition of the country.The National Civil Aviation Policy 2016 has been hailed as a robust policy, although it is not the first ever 'post-independence' civil aviation policy. The policy aims to provide affordable air travel to all citizens and helps in constructing and reviving airstrips to improve access to air travel.

However, the policy is not free from loopholes as it failed to discuss or mention one of the most pressing issues, environmental impact and sustainability. Notably, none of the international organisations has made any 'substantive' progress in addressing this issue. The International Civil Aviation Organisation (ICAO) passed a resolution in its 41st session in Montréal, which acknowledged the shortcomings in the

© [Author(s)] — Published in *Lex ad Coelum* with permission.

progress made concerning the reduction in CO2 (carbon dioxide) emissions. ICAO has also made a compulsion to the member states to make efforts in the progress of aircraft technologies, operational improvements, and sustainable aviation fuels.

Impact of SARPs

The Standards and Recommended Practices (SARPs) are guidelines issued and adopted by the ICAO to address the different issues of civil aviation by ensuring uniformity in the standards and regulations.Article 38 of the Convention on International Civil Aviation (Chicago Convention) states that the Member States should notify the ICAO in case they find the provisions impractical to comply with or to bring their standards in conformity with SARPs.

One such SARP is in the form of Annex 16 of the Chicago Convention, referred to as the 'Environmental Protection', which has addressed three key areas. First, aircraft noise, for which the Annex provides guidelines for controlling and reducing aircraft noise, particularly during takeoff and landing. It recommends using quieter aircraft technology, noise abatement procedures, and the establishment of noise certification standards for aircraft engines and airframes. The second issue is the emissions from aircraft engines, where the development and usage of environment friendly engine technology, such as low-emission engines, have been encouraged by the ICAO. Finally, fuel efficiency is the other issue addressed, wherein it is aimed towards reducing harmful emissions and encouraging the use of operational practices such as strategic air traffic management and reduction in the aircraft's weight.

The national aviation authorities of the Member States are responsible for implementing these standards within their respective jurisdictions. They must work closely with airlines, aircraft manufacturers, and other stakeholders to enforce the recommended practices and monitor progress towards environmental goals. However, the SARPs lack the legally binding power, which their parent Convention enjoys. They are worded as recommendations to the Member States in case they want to follow to amplify their safety and sustainability standards.

Annex 16 of the Convention on International Civil Aviation provides an important approach to addressing the noise pollution issue that emerges from aircraft operations. The approach is directed towards reducing noise at the source. By

© [Author(s)] — Published in *Lex ad Coelum* with permission.

observing this approach, specific measures such as imposing an 'airport curfew' would be reasonable to reduce the effects of noise pollution caused by aircraft, as far as the concerned airport is domestic since they are pretty much isolated from the complexities arising due to time zones and national borders. However, the curfew policy would adversely restrict international airports due to the flights flying across domestic borders. For example, a flight scheduled from the United Kingdom cannot be restricted in Indian airports based on their international nature, different time zones and different jurisdictions.

Even though the SARPs are yet to be enacted in municipal laws of the member states, it is remarkable that they do impact the aviation industry and their approach to addressing the issue at hand. Annex 16 has led to the establishment of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), a one-of-a-kind market standard developed intending to address the impact on the environment due to aviation emissions. It was introduced in the ICAO Assembly's 39th session in 2016.

In the development process of SARP regulations, several airlines have made an effort with their sustainable aviation fuels and operations. For instance, Air France-KLM launched the first long-haul flight using sustainable aviation fuel (SAF), a biofuel manufactured completely in France's refineries on 18 May 2021. Air France's newest Airbus A350-900 sailed from Paris to Montreal, the world's civil aviation centre, using a fuel combination that included 16% sustainable fuel, preventing 20 tonnes of CO2 emission, which clearly shows that the efforts are been made by the industries towards achieving environmental sustainability.

Under the 'Air France ACT' a programme aimed at reducing CO2 emissions per passenger-kilometer by 30% by 2030 compared to 2019, two of its flights left Paris-Charles de Gaulle, one to Montreal on 3 May 2022, and the other to Lisbon on 4 May 2022. The ICAO Council amended several international aviation environmental rules in March 2023 as it continues to make progress during its 228th session. A new addition to Annex 16 of the Chicago Convention clarifies the ICAO's CORSIA monitoring, reporting, and verification responsibilities.

The United Nations Framework Convention on Climate Change (UNFCCC) 1997, based on the Kyoto Protocol, establishes its objectives in reduction of emissions of

© [Author(s)] — Published in *Lex ad Coelum* with permission.

greenhouse gases but fails to address the international aviation emissions and the economic expenditure of the Member States in controlling carbon emissions. Accordingly, the ICAO General Assembly has introduced CORSIA to tackle these issues which were not addressed in UNFCCC. Paragraph 9 of Resolution A41-22 of the ICAO called for a phased implementation of the CORSIA as it is aimed at accommodating "the special circumstances and respective capabilities of States, in particular developing States while minimising market distortion."

Certain nations such as India have taken the initiative to enforce the said SARPs by welcoming the Airport Carbon Accreditation, where the aim is to reduce carbon emissions. The Delhi International Airport Limited (DIAL), for example, has showcased massive progress in the same, showcasing their potential and commitment to turn 'net zero carbon emission' airport by 2030.

To decarbonize the Indian aviation sector by 2050, a variety of initiatives are required, including fleet renewal with efficient flights, operational improvements in Air Traffic Management (ATM), and the usage of a SAF-ATF blend. Furthermore, the widespread use of TaxiBots to handle air-taxing at Indian airports will significantly induce Member States to reduce greenhouse gas (GHG) emissions. Meanwhile, research in electrification and hydrogen fuel is required to develop aircraft solutions. The government should offer sufficient funding to stimulate research and pilot studies on SAF manufacturing techniques and diverse locally accessible feed stocks.

Shortcomings of the Ongoing Efforts

The Kyoto Protocol 1997 has mandated the GHG emissions, but there were no goals set on controlling the emissions due to the global aviation industry. Even though the Member States were working to achieve the goals of Kyoto Protocol in other sectors, there was tremendous increase in aviation emissions. Hence, the ICAO acted as a guiding factor for the Member States in controlling international aviation emissions. In the year 1999, The Intergovernmental Panel on Climate Change (IPCC) has prepared a report which underlined and identified the need to have more rigid engine regulations and for the removal of subsidies and incentives which would harm the environment. Thus, the report published by the IPCC has highlighted the shortcomings with respect to global climate change framework.

© [Author(s)] — Published in *Lex ad Coelum* with permission.

The ICAO has also failed to come up with 'concrete' solutions which would help mitigate the problem. It has been working along with its Member States to inflate its mandate to include the mitigation of climate change due to the aviation industry. In this effort, the ICAO has interpreted its parent legislation in a way that empowers itself to regulate GHG emissions without an explicit mention of mitigation of climate change. However, the absence of the said mention does flare up when fixing accountability.

As mentioned above, CORSIA was introduced by the ICAO to fill-in the gaps of the Kyoto Protocol. It allows the airlines to emit a certain amount of carbon but with a condition to invest in purchase of carbon offsets. However, ICAO has failed to implement the regulatory framework of environment by not strictly restricting the emissions of the aviation industry. Thus by allowing partially to emit carbon into the atmosphere coupled with the failure to have a proper regulatory framework, the danger has been only reduced rather than eliminated by ICAO.

Conclusion

The aviation industry is a booming sector which is expected to handle a billion passengers per annum in the coming years. Being an industry commanding around 3.6% of the global GDP, it must implement sustainability effectively. The decarbonization of the routes regarding aviation industry can be done by proper use and implementation of CORSIA and use of SAF. To achieve a better segregation and supply chain mechanisms for the steady supply of SAF, aviation business must aim for research and development of cost-effective SAF. The environmental concerns of civil aviation can be solved only by ensuring a constant supply of the SAF on a massive scale. Such large-scale production can reduce the overall cost and make it at par with the cost of the commonly used aviation turbine fuel.

Given the fact that the aviation sector is one of the biggest factors for climate change and GHG emissions, ICAO should address the issue of mitigating climate change explicitly to bring accountability to the table. The responsibility of Member States concerning the compliance of the guidelines needs emphasis to better handle the situation.

© [Author(s)] — Published in *Lex ad Coelum* with permission.

Notes & References:

* The author is an Associate Professor at ICFAI Law School, ICFAI University, Hyderabad, Telangana.

© [Author(s)] — Published in *Lex ad Coelum* with permission.